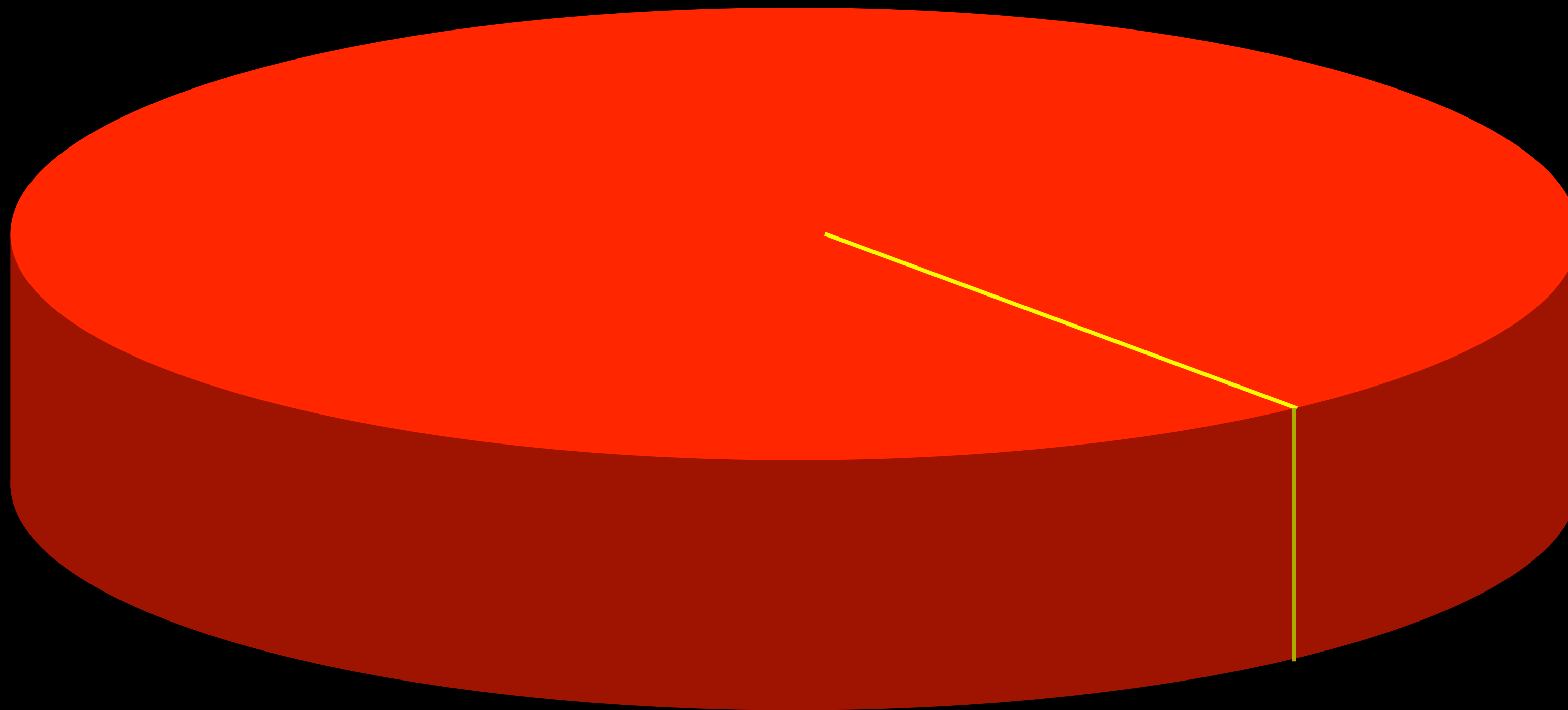
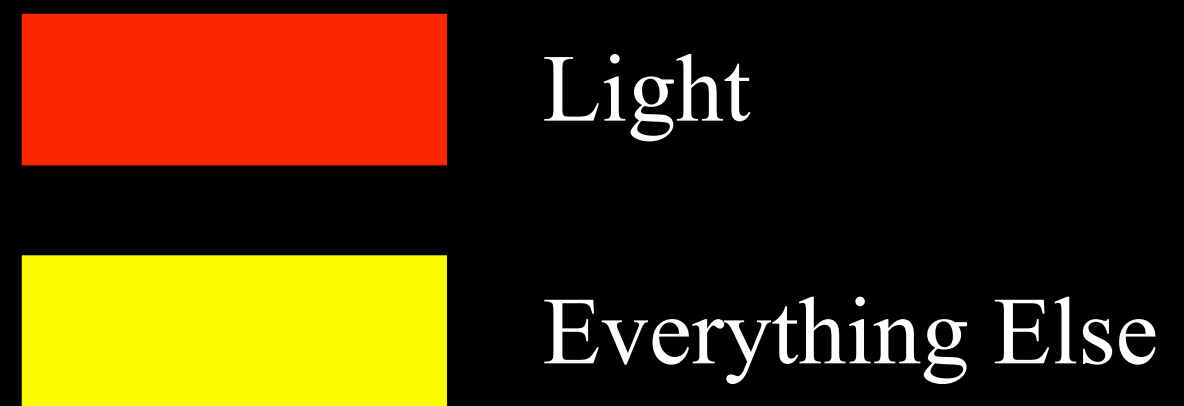




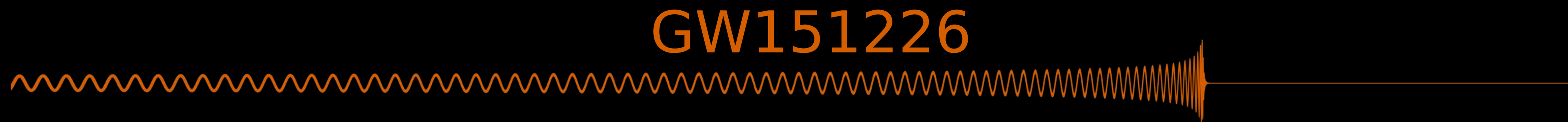
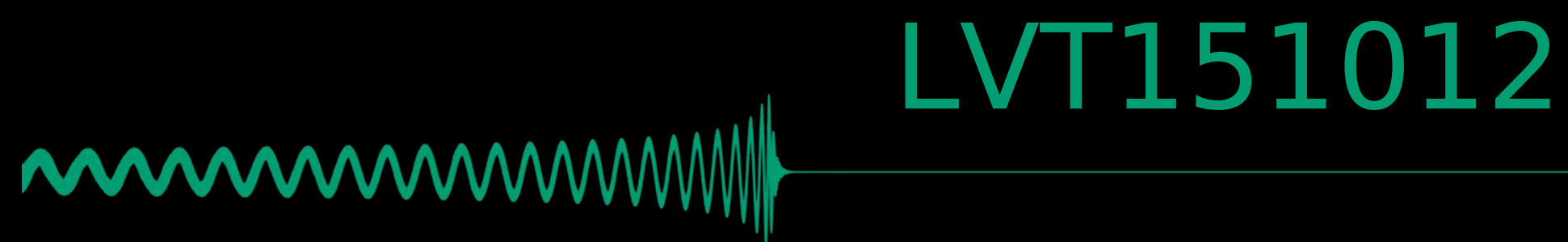
The Discovery of GW170817









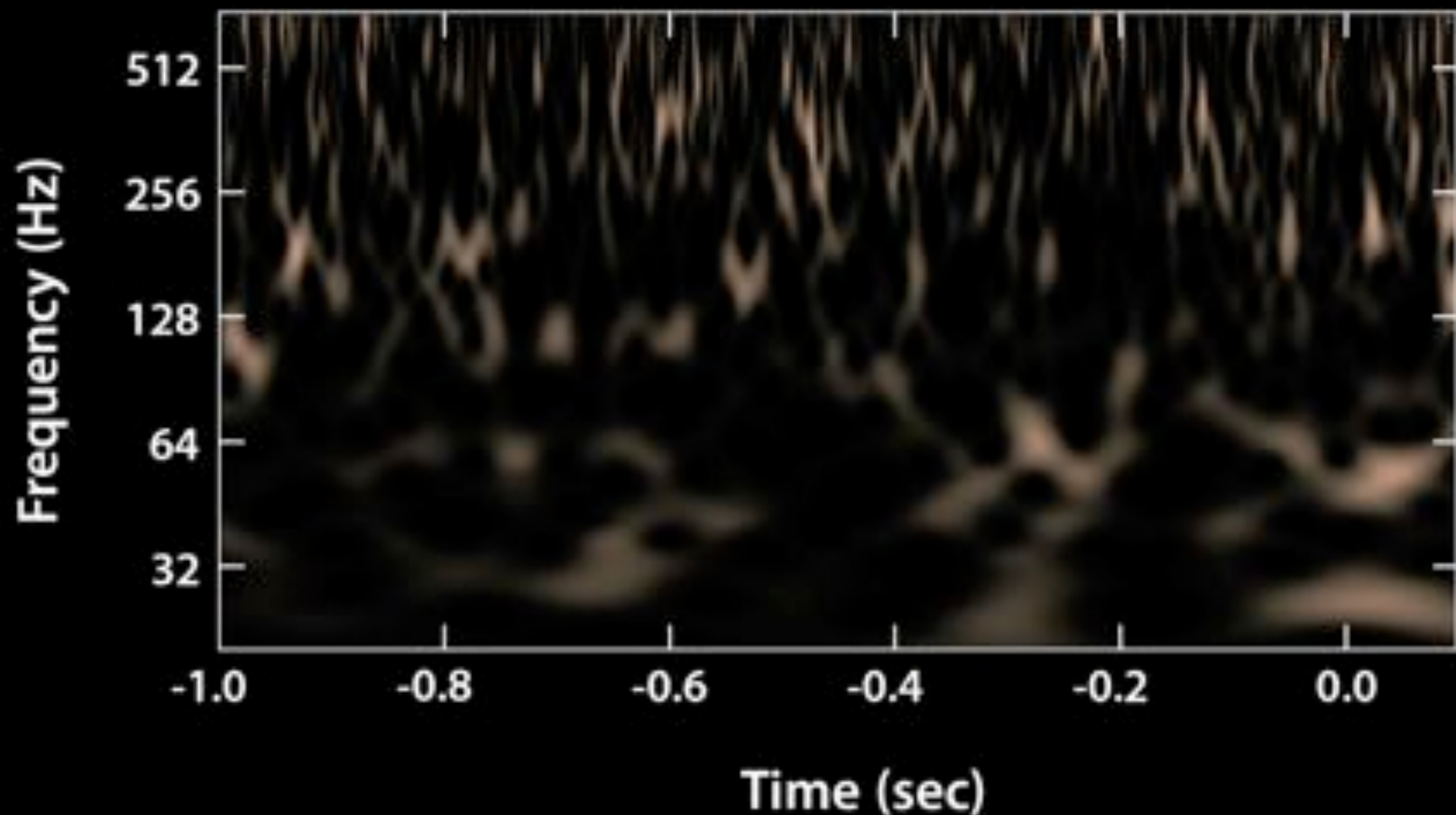


0 sec. 1 sec. 2 sec.

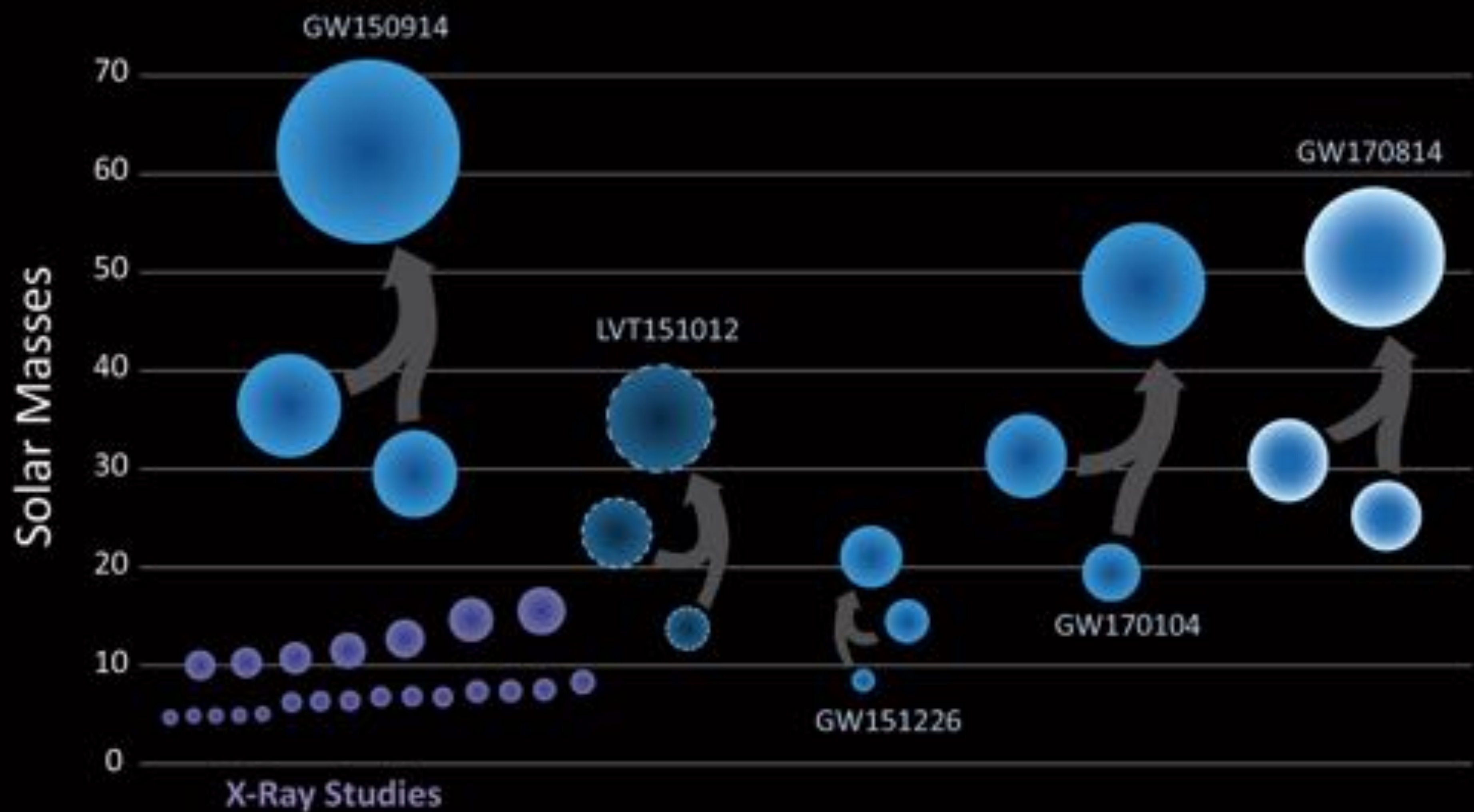
time observable by LIGO-Virgo

December 26, 2015

Hanford Observatory
Increased Pitch

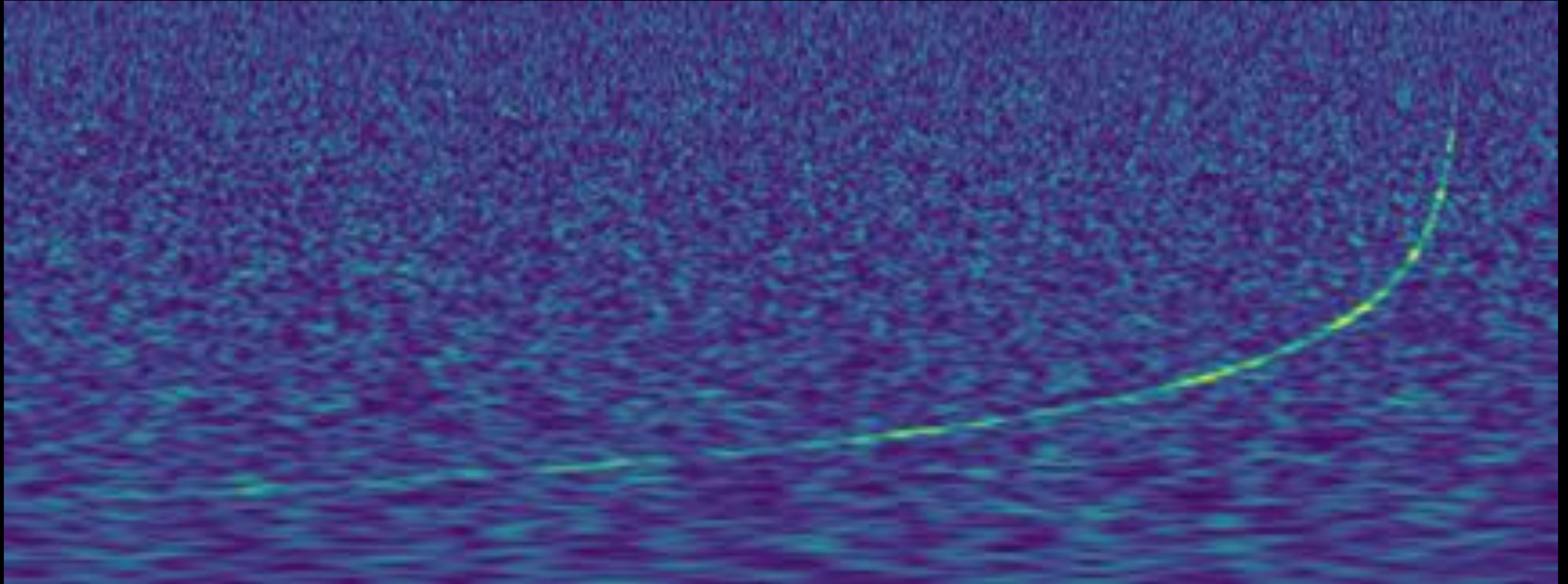


Black Holes of Known Mass



August 17, 2017

— frequency (pitch) —



— strength —

time

GW150914



LVT151012



GW151226



GW170104



GW170814



GW170817

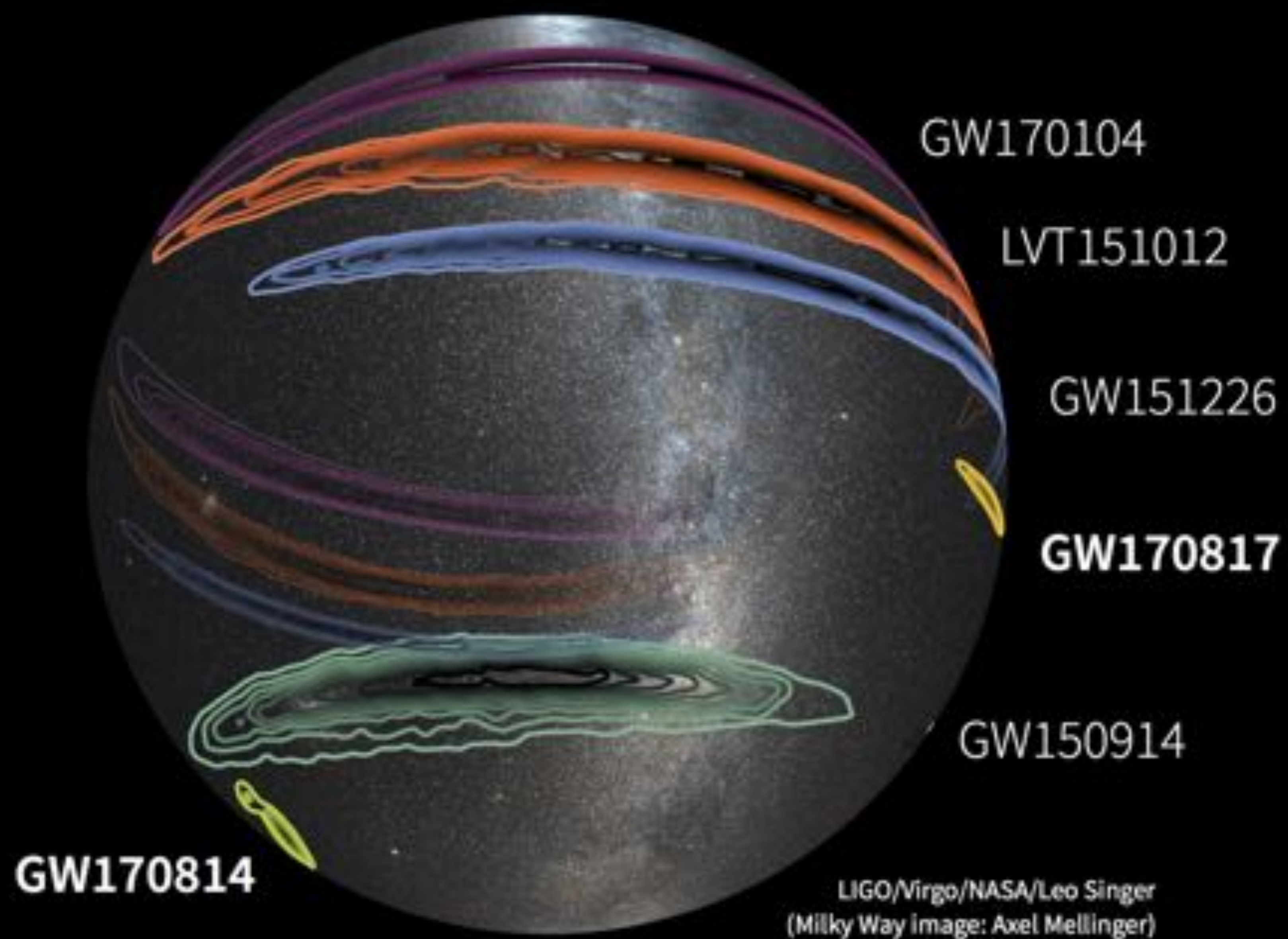




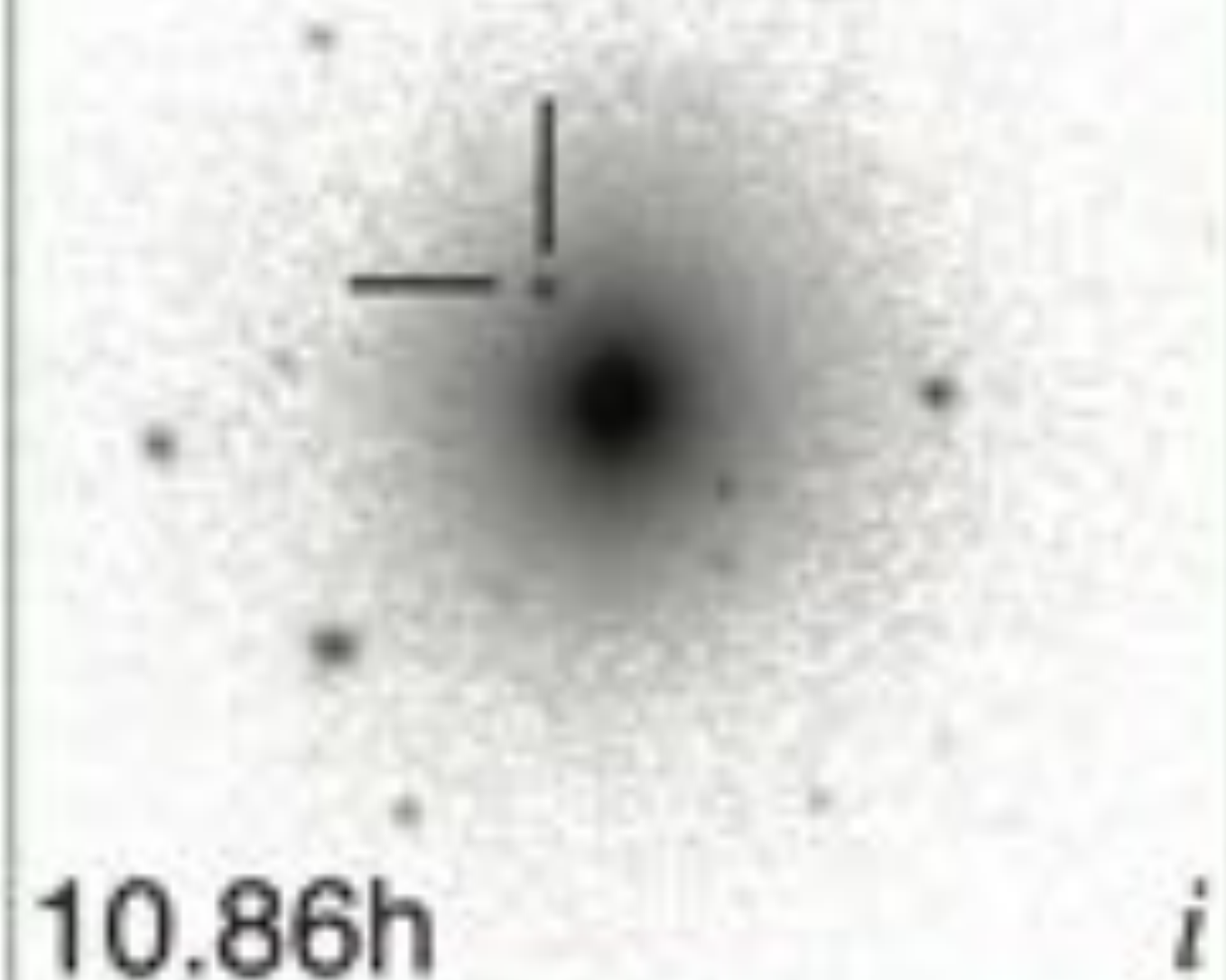
Earth

Space

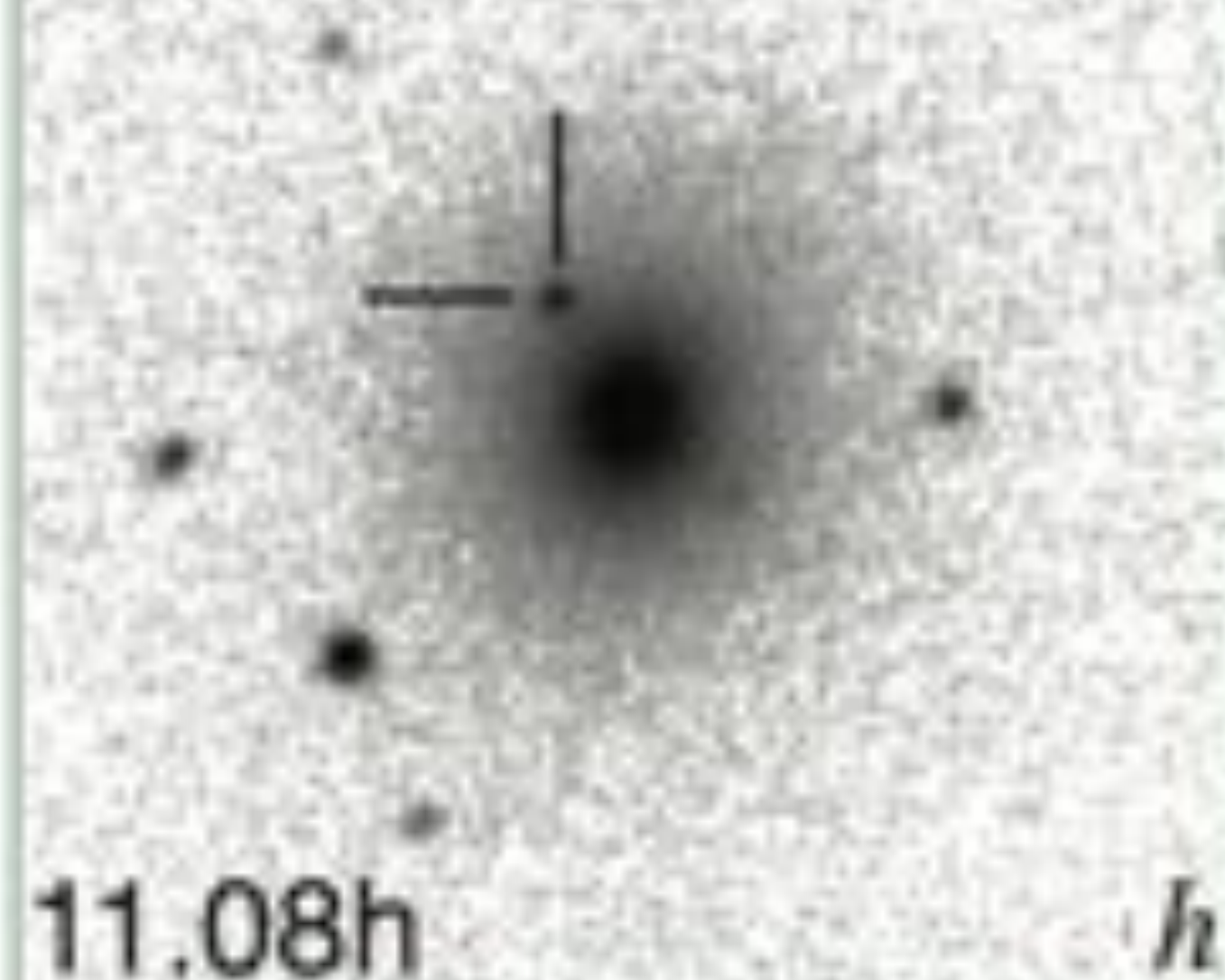




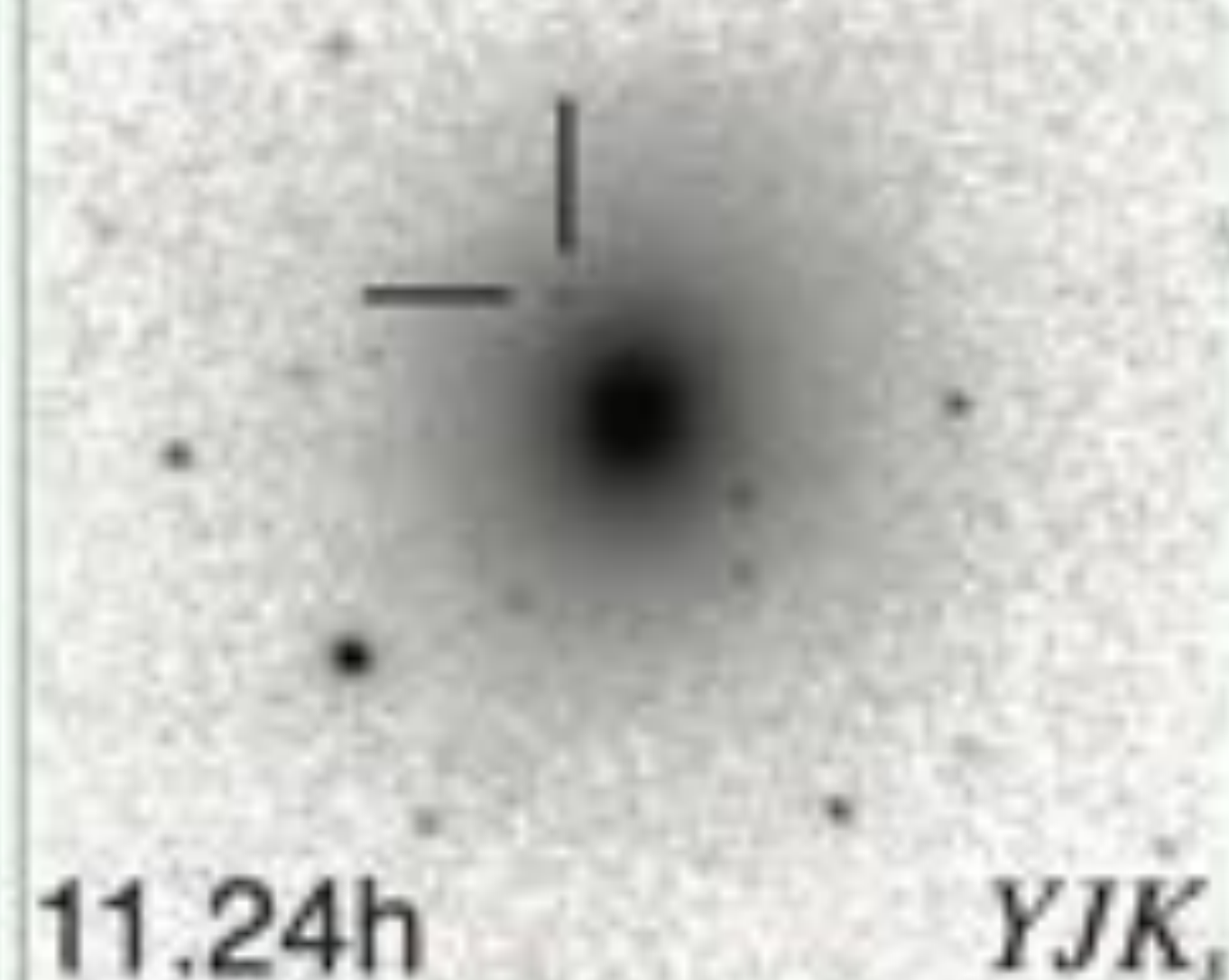
1M2H Swope



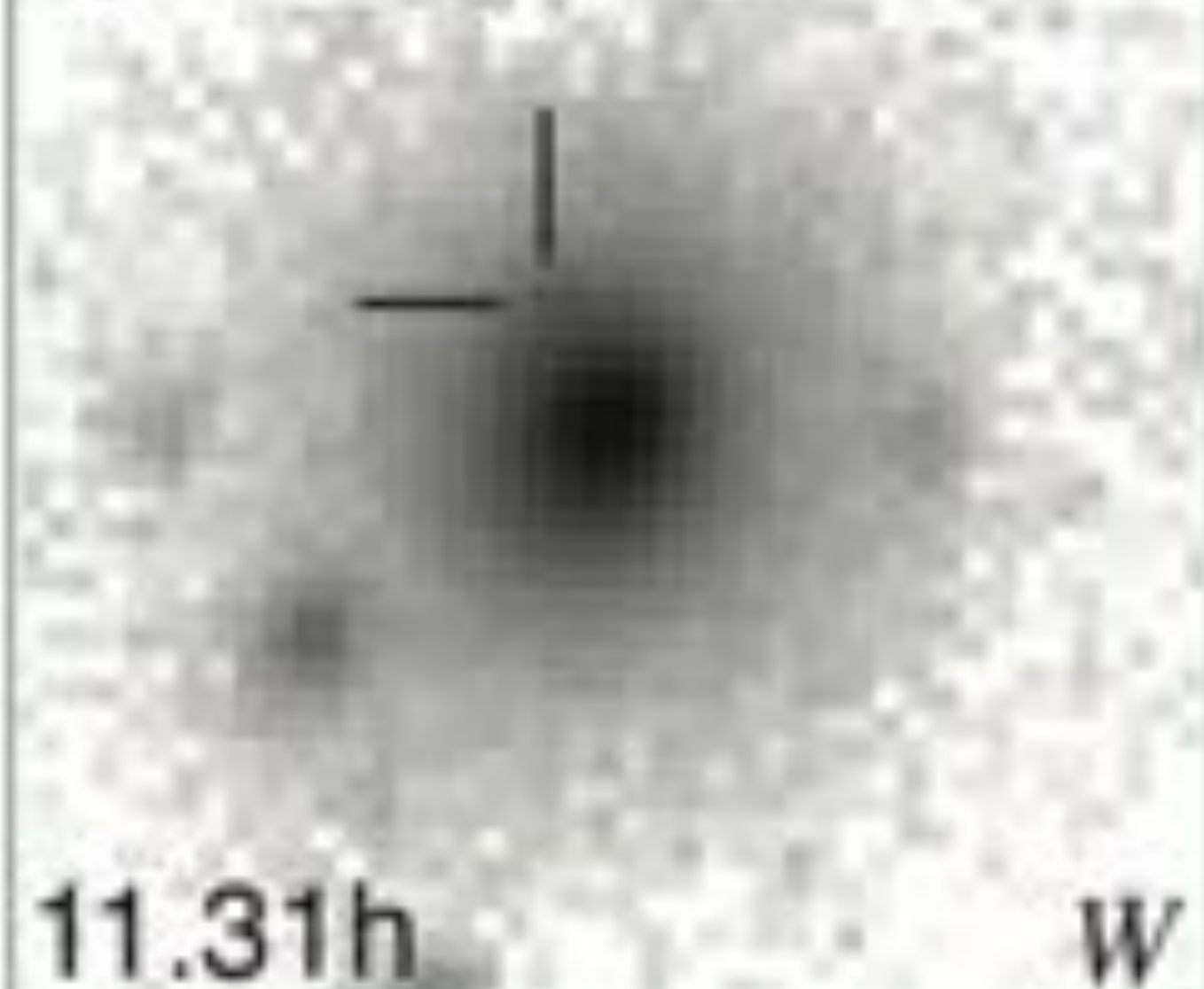
DLT40



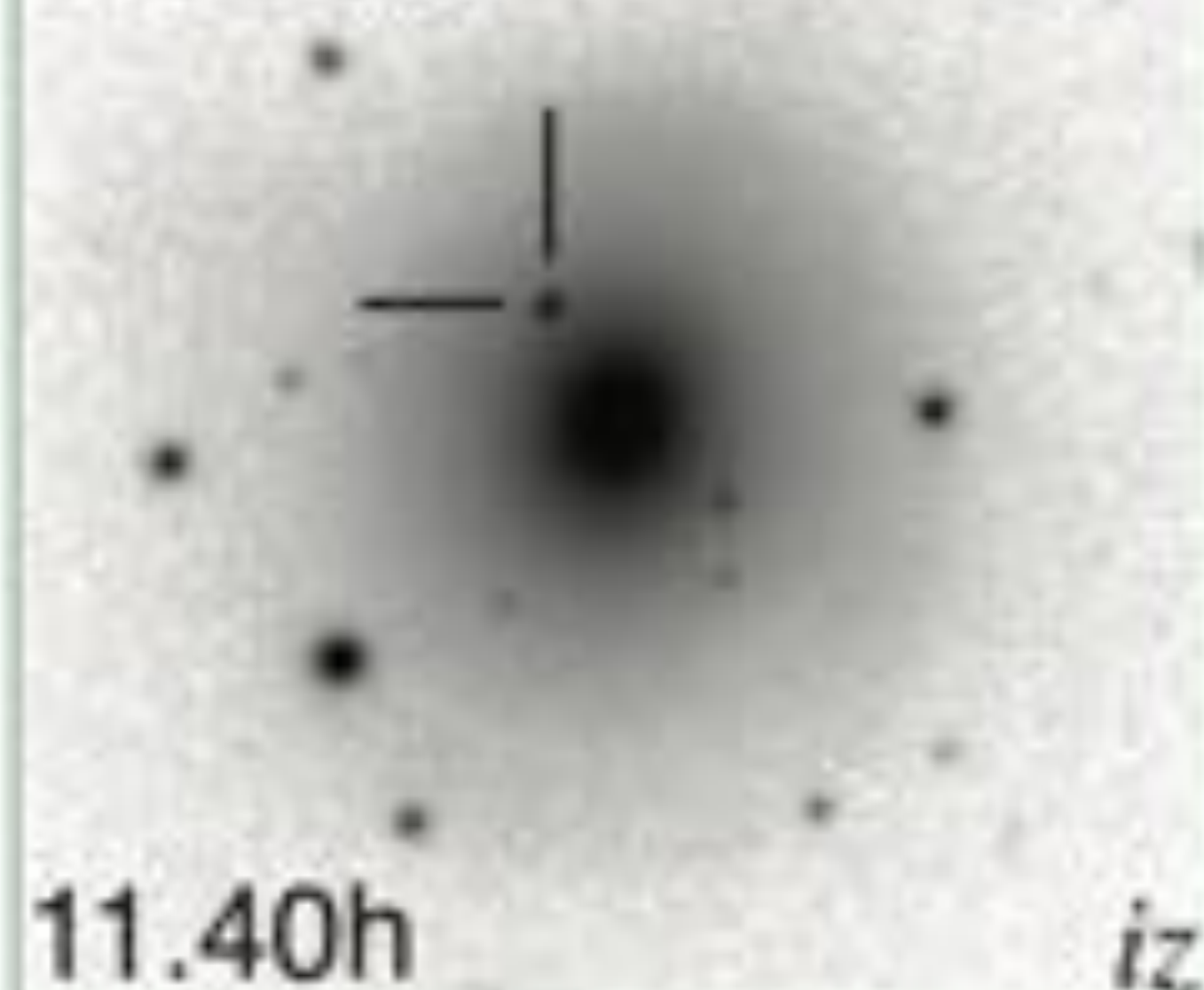
VISTA



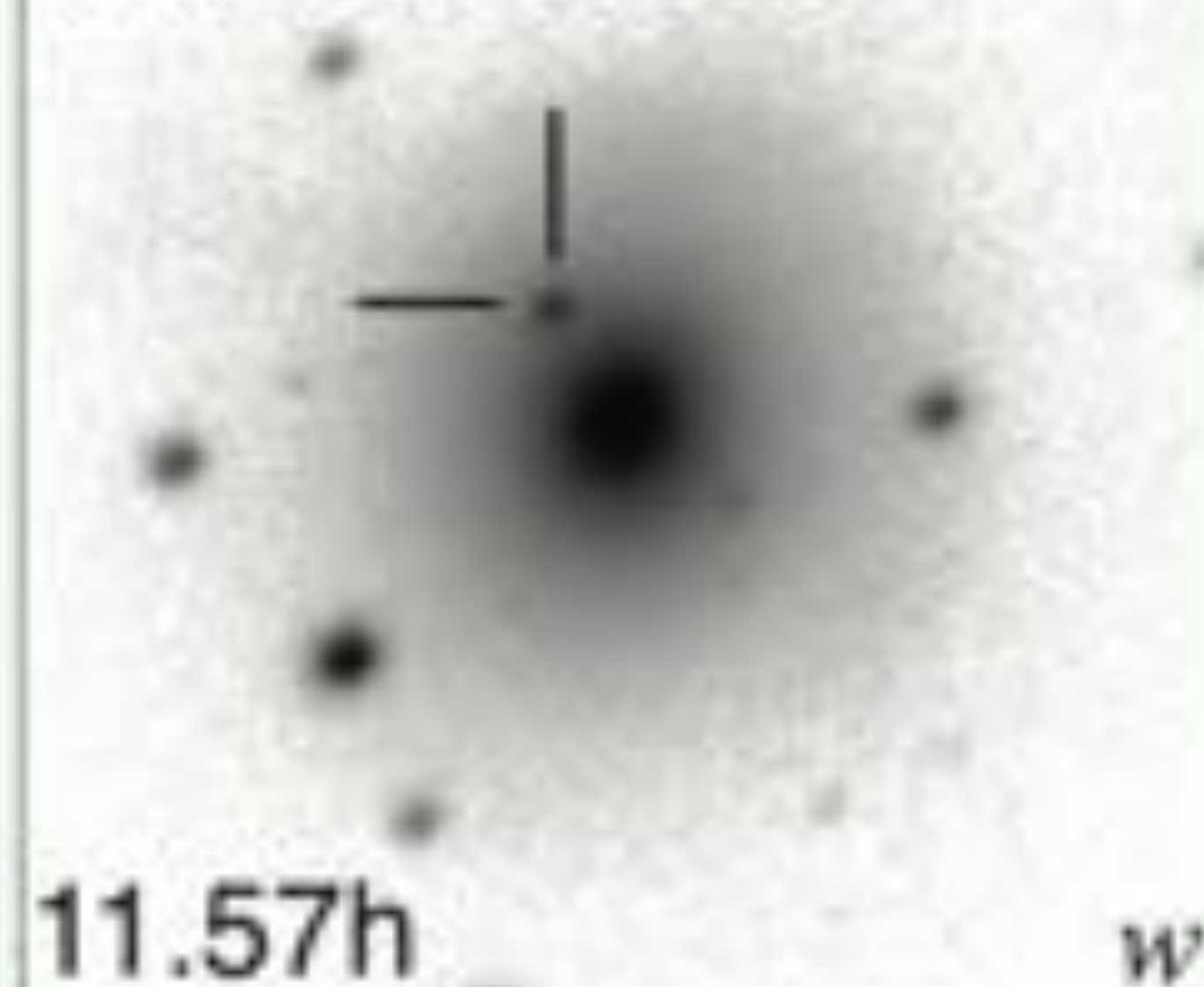
MASTER

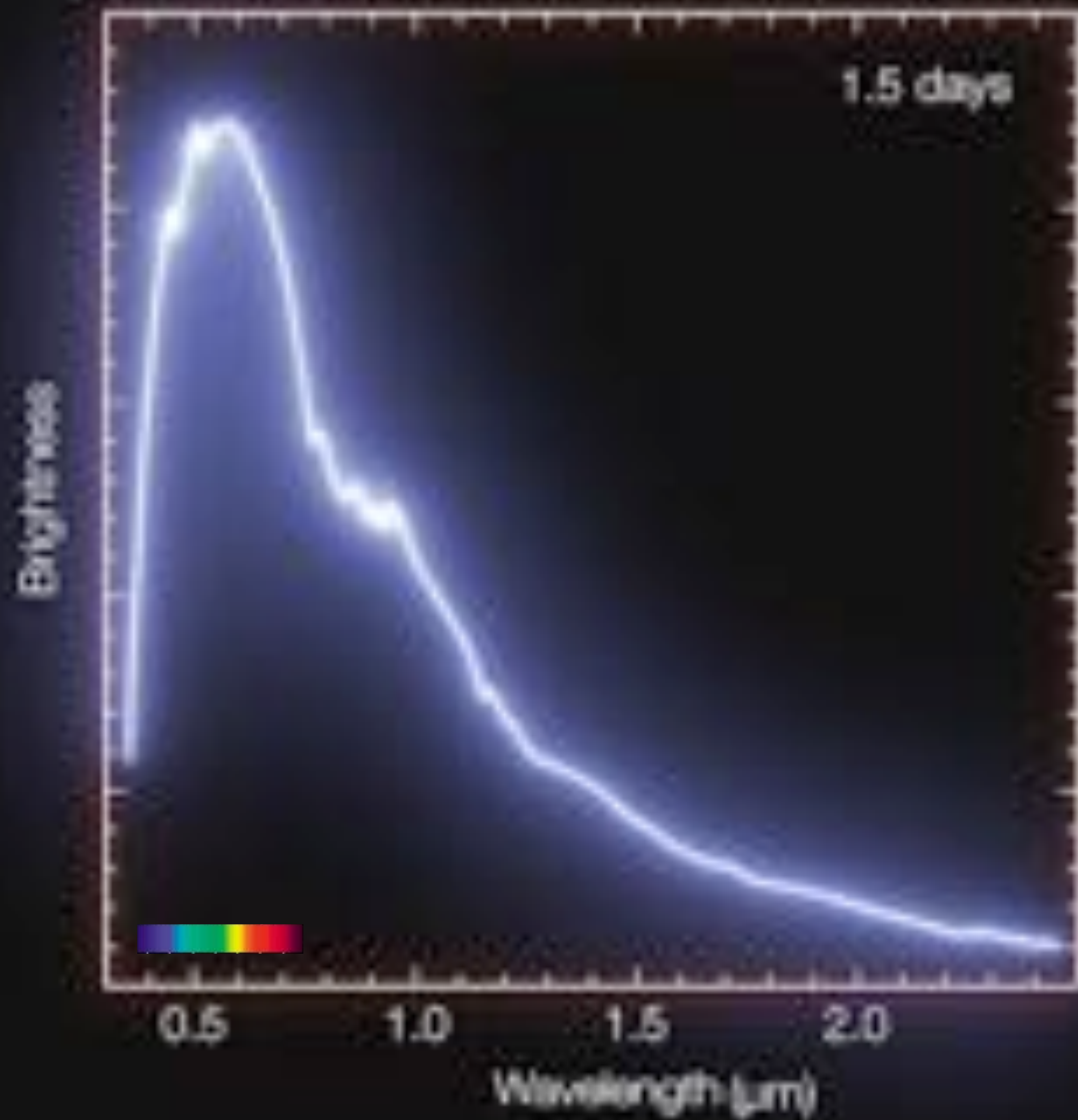


DECam



Las Cumbres





ESO-VLT/X-Shooter



NASA and ESA

Element Origins

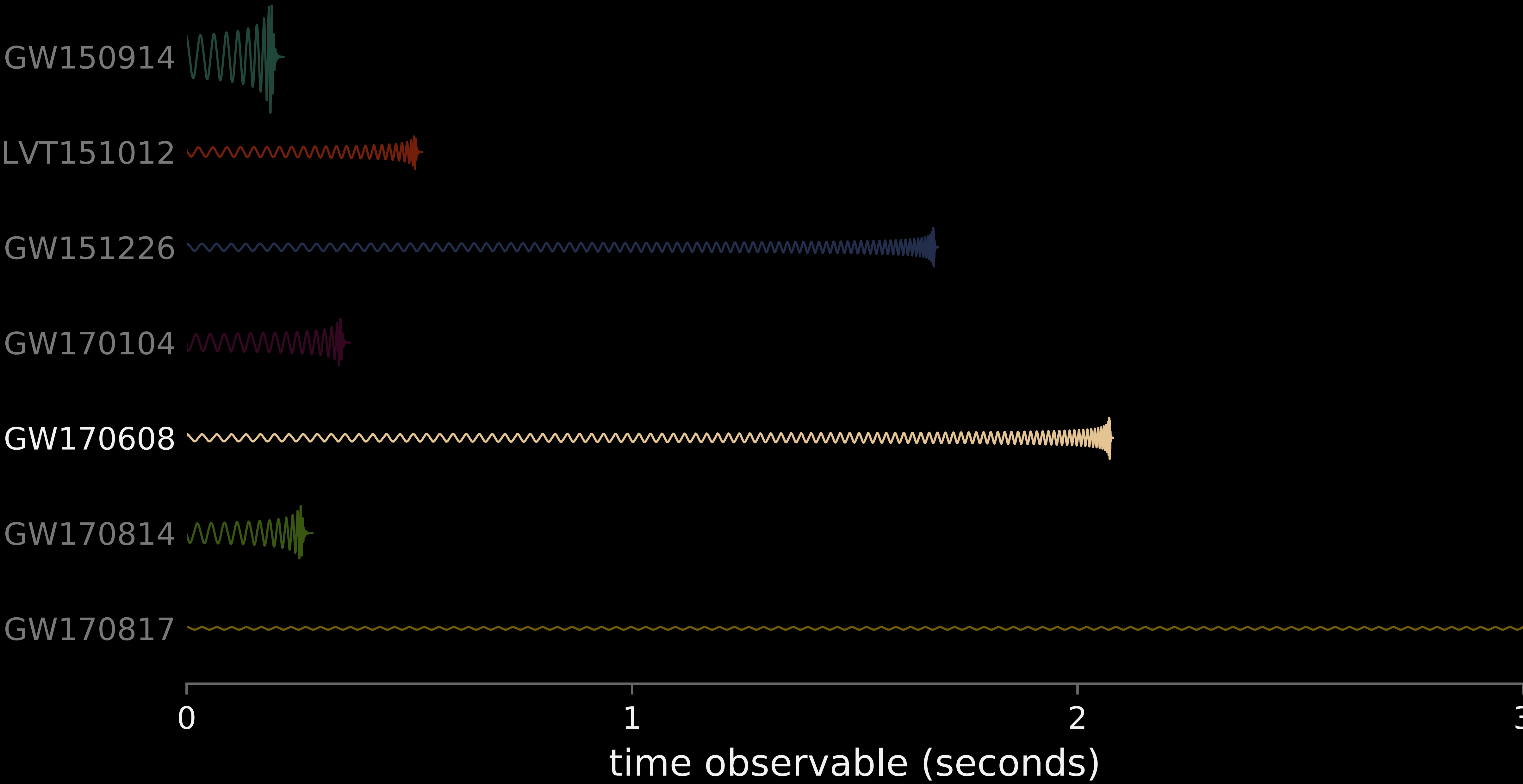
Element Origins

1 H																	2 He		
3 Li	4 Be													5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg													13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr		
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe		
55 Cs	56 Ba			72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn	
87 Fr	88 Ra																		
		57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu			
		89 Ac	90 Th	91 Pa	92 U														

Merging Neutron Stars
Dying Low Mass Stars

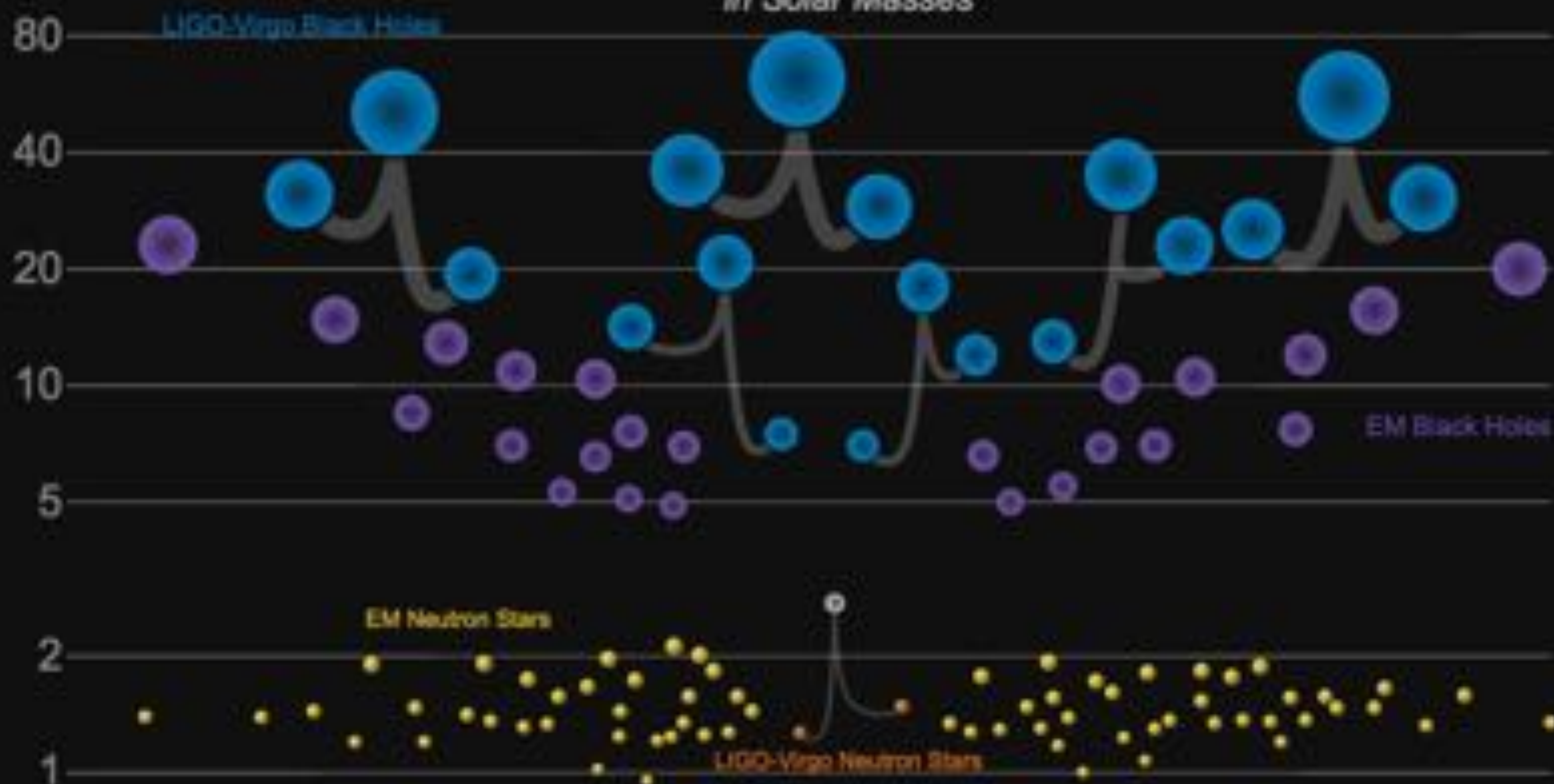
Exploding Massive Stars
Exploding White Dwarfs

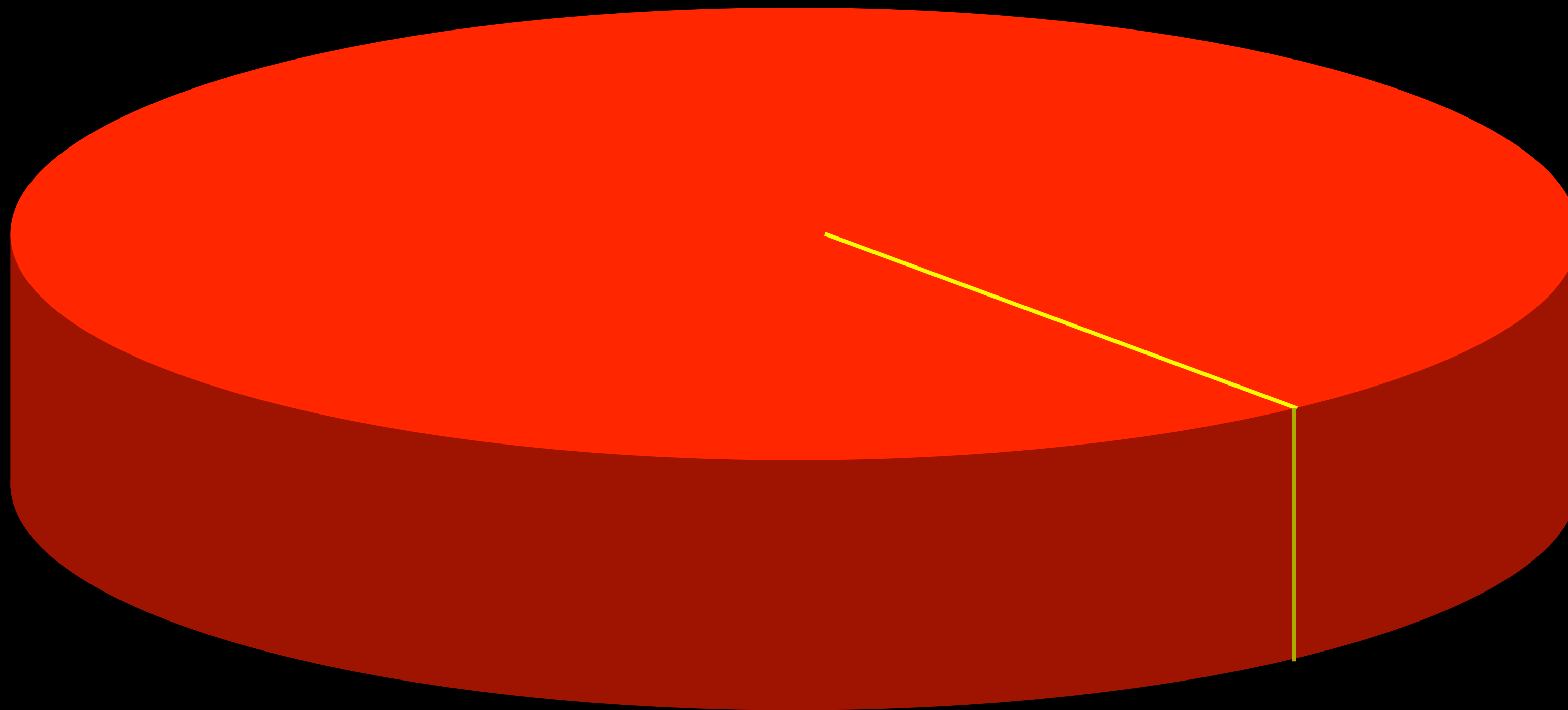
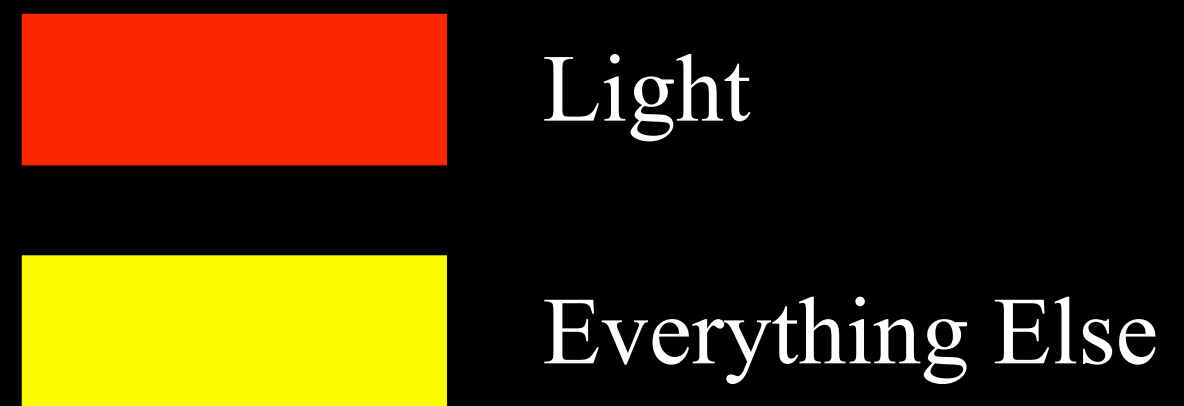
Big Bang
Cosmic Ray Fission

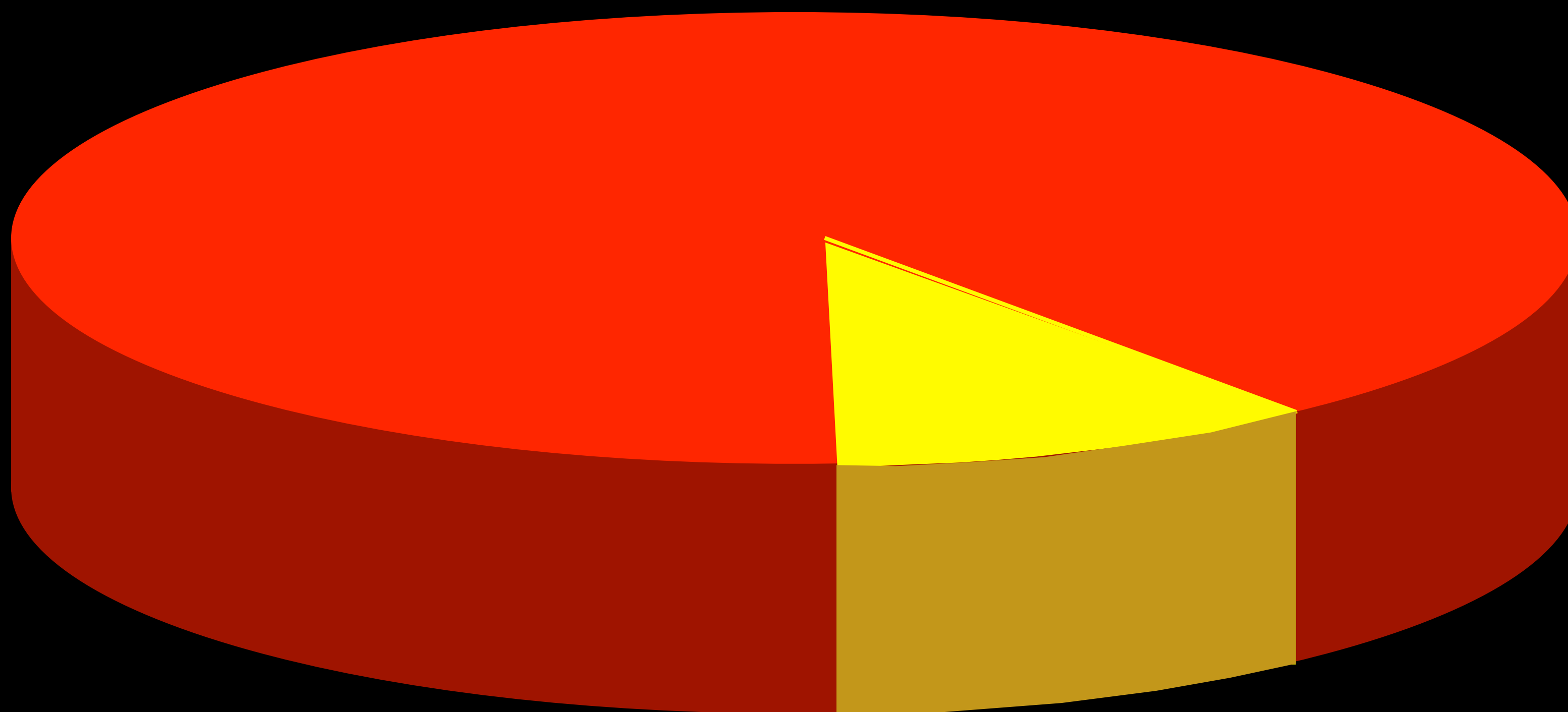
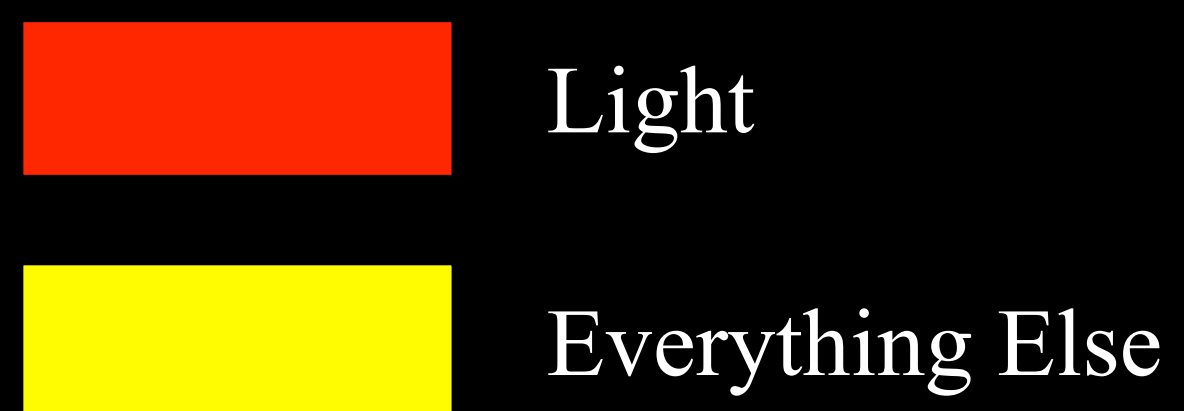


Masses in the Stellar Graveyard

In Solar Masses









The Discovery of GW170817